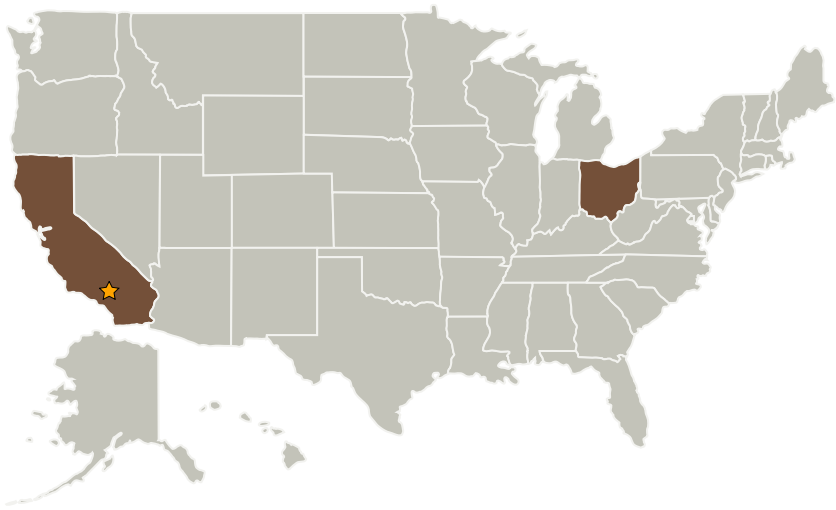
Self-Repairing Flight Control System for Online Health Monitoring and Recovery, Phase I

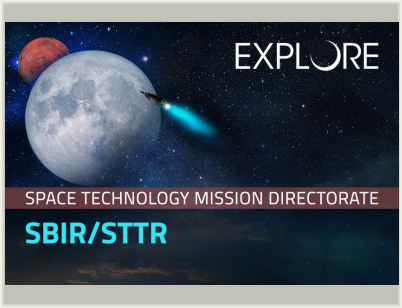
Completed Technology Project (2005 - 2005)

Project Introduction

In this SBIR project, a reliable self-repairing Flight Control System (FCS) will be developed. To achieve this goal, an artificial Neural Network based Sensor Validity Monitoring, Verification and Accommodation (SVMVA) scheme will be developed. Initially, the Extended Back Propagation Algorithm (EBPA) or Learning Vector Quantization (LVQ) will be evaluated and employed as the on-line real time learning, monitoring and estimating tools. For a feasibility study, sample flight vehicle dynamics will be assessed. Then, an optimal on-line estimator for the flight dynamics will be shown by applying our unique input vector discrimination procedure and network optimization technique. In Phase I, an in-house numerical simulation tool for SVMVA will be developed to demonstrate the feasibility of our approach. As a result, it is expected that the new self-repairing Flight Control System based on SVMVA scheme will meet or exceed the NASA's requirement for their new flight vehicles. The most significant advantage of the new self-repairing Flight Control System is that the system is able to mask failed physical sensors by providing flight-worthy flight dynamics information to most FCS of flight vehicles without needing redundant sensors or excessive power, weight and space.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
SenAnTech, Inc.	Supporting Organization	Industry	Columbus, Ohio

Primary U.S. Work Locations	
California	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Seung-keon Kwak

Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
  - TX16.4 Architectures and Infrastructure